

IMPROVED LOAD BINDER

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IMPROVED LOAD BINDER

Field of the Invention

5 This invention relates to a mechanical device used to tighten and secure bindings such as a link chain being used to stabilize and secure heavy cargo or equipment on a cargo carrying vehicle or vessel including trucks, trains, planes and ships.

Background of Invention

10 There are numerous examples that can be cited to explain how items are loaded e.g. on flatbed trailers, rail cars, boat decks and the like. All have a common problem that will be here addressed as that problem relates to the loading and hauling of logs by a logging truck. Such is but one example and those skilled in the art will understand that the invention is equally applicable to many other load hauling uses.

15 Different sizes of logs, e.g., 10-20 inches in diameter and 20-30 feet in length, are commonly hauled from a forest site to a logging mill. The truck traverses rough roads and many curves that produce conditions where the logs can roll off of the truck bed. Each log is very heavy and inadvertent rolling of the log off the load can produce disastrous results and is to be avoided.

20 It has long been common to secure the load with chains that are wrapped around the entire load of logs. A binder has opposing ends with hooks that are hooked into two spaced apart chain links of the chain. The binder includes a means to draw the hooked links together to tighten the chain and a latch mechanism secures the chain in the tightened condition.

25 An early version of such a binder is referred to as a lever binder. The lever binder uses an over-center mechanism to draw the chain links together a stated length, e.g., 3 inches. The lever is pivoted using brute force to force the lever to an over-center position and in the process draw the chain ends together by the stated 3 inch margin. No incremental adjustments are available. Should the load shift to

cause loosening of the chain, the binder lever has to be released, the hook ends reset, and the lever action repeated. Not only is the tightening effect limited, the substantial energy stored by such over-center tightening can cause kickback that can result in serious injury or even death to the user of the device.

5 The above lever binder has, more recently, been largely replaced by a ratchet binder. A center tube has left and right hand threads at the tube ends and a threaded shaft moves into and out of each end of the tube. The shafts are fitted with hooks that hook onto the respective chain ends and are prevented from turning. Turning of the tube is achieved by a ratchet mechanism (pawl and ratchet gear) operated with a
10 handle. The handle is worked back and forth to turn the tube relative to the shafts which draws the shafts into the tube and thereby achieves tightening of the chain. The ratchet mechanism can be reversed to extend the shafts from the tube for loosening of the chain binder, again by working the handle back and forth.

 The ratchet binder is safer as it does not produce kickback. Also it can be
15 incrementally adjusted to any length within the differential of the shafts being fully extended and fully retracted from the tube ends, e.g., an 8 inch length of draw. It has, however, two primary drawbacks which are speed of operation (or lack thereof) and awkward storage. The handle protrudes from the tube at a right angle and requires storage in a storage space that is the length of the tube and the width of the
20 tube plus handle length.

Brief Description of the Invention

 In a preferred embodiment of the invention, the ratchet mechanism as described above is modified to provide the previous two position settings of the mechanism and alternate in-and-out pawl engagement but having a third position
25 where the pawl can be parked in non-engagement position. Thus, where lever force is required to either extend the shafts out or retract the shafts in, the pawl can be biasingly flipped to rotate the tube clockwise or counterclockwise. If, however, at the point where the binding tension is released, the pawl can be retentively centered for non-engagement with the gear, and the tube can be freely hand turned to enable
30 rapid extension or contraction of the shafts.

A further improvement for the preferred embodiment is the provision of a folding handle which allows for a 90 degree position (relative to the tube) for leveraged ratcheting and a parallel position for either storage or at completion of the cinching operation. A still further improvement is the provision of vandal-proof locking of the ratchet mechanism. A housing component and the latching pawl are provided with through bores that become aligned with the pawl in a position for drawing the shafts into the tube. When a fully tightened condition is reached, a lock such as a common padlock can be inserted through the aligned bores and a chain link to ensure that the pawl cannot be released from its contracted position and the binder cannot be removed from the chain.

The invention as briefly described above in connection with a preferred embodiment of the invention will be more fully understood and appreciated upon reference to the following detailed description, having reference to the accompanying drawings.

Brief Description of Drawings

Figure 1 is a perspective view of a load binder in accordance with the present invention;

Figure 2 is a side view of the device of Fig. 1 but illustrating the device in operational conditions;

Fig. 2A is a cross sectional view of the tube and shafts of Fig. 2 but in a fully extended position and illustrating the relative right and left hand threading of the components;

Figs. 3, 4 and 5 are section views as taken on sections lines 3-3 of Fig. 2 showing the three operational positions of the ratchet mechanism of the device with Fig. 3A specifically illustrating the design of the pawl used in the device.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Reference is first made to Fig. 2A which illustrates the operation of a ratchet load binder in accordance with the present invention. Chain links 10 and 12 represent spaced apart links, e.g. of a length of chain wrapped around a load, e.g. of

logs loaded on a logging truck. Whereas Figs. 2 and 2A do not show a continuum of the chain links, i.e. links 10 and 12 interconnected by a sequence of links, it is most common to simply connect hooks 28, 30 at the most convenient position along the chain length and drawing of links 10 and 12 together produces a loosening of the intermediate links and it is these links that provide the loosened loop of chain for locking the chain to the ratchet mechanism as seen in Fig. 1 and which will be explained hereafter. Returning now to the description of the ratchet hook binder, device 14 includes a tube 16 with a ratchet gear 18 fixedly secured (as by welding) to one end of the tube 16. Tube 16 is threaded at its inner side with left handed threads 20 at one half and right handed threads 22 at the other half. Shafts 24, 26 are correspondingly threaded so that rotation of tube 16 in one rotative direction relative to both shafts 24, 26 causes both shafts 24, 26 to move inwardly on threads 20, 22 respectively, and rotation of tube 16 in the opposite direction causes both shafts 24, 26 to move outwardly on threads 20, 22 respectively. Thus, with the hook ends 28, 30 prevented from rotating, e.g., as when hooked to chain links 10, 12, rotation of tube 16 produces simultaneous inner or outer movement of both shafts 24, 26.

It will accordingly be understood that with the shafts 24, 26 extended as shown in Fig. 2A, the hooks 28, 30 are secured to the chain ends at those links of the chain most conveniently engageable by the hooks 28, 30 following hand tightening of the chain around the load. As so tightened and as will be explained hereafter, the tube 16 is rotated in a direction that causes the shafts 24, 26 to move into the tube and which thereby further tightens the chain onto the load.

Reference is now made to Figs. 2 and 3 wherein the ratchet housing 32 is shown assembled onto the end of the tube 16 and surrounding gear 18. As seen most clearly in Fig. 3 (but note also Figs. 4 and 5), pawl 34 is pivotally mounted via pin 35 to housing 32. Except for the presence of pawl 34, housing 32 is freely rotatable about the gear 18 that is fixed to the end of tube 16.

Reference is now made to Fig. 3A which illustrates pawl 34. Ends 36 and 38 are configured to fit the gullets between the teeth of gear 18 as will be apparent from Figs. 3 and 5. At the apex of the inverted V-shaped pawl 34 are depressions 40, 42, and 44. From Figs. 3, 4 and 5 it will be seen that the ratchet housing 32
5 includes a pocket 46 that contains a spring 48 and pinion 50, which pinion is urged by the spring into contact with the apex position of pawl 34. As viewed in Fig. 3, with pinion 50 seated in depression 40, the housing 32 can be pivoted relative to gear 18 in a counterclockwise direction (as indicated by arrow 53) but not in a clockwise direction. Thus, a counterclockwise rotation of housing 32 will result in
10 the pawl end 38 being cammed out of the gullet 52 (against spring 48) to become seated in the next clockwise gullet 52 without rotation of gear 18. Clockwise pivoting of housing 32 will produce clockwise rotation of gear 18 and such rotation rotates tube 16 which results in inwardly directed movement of shafts 24 and 26.

Manual pivotal movement of the pawl past depression 42 and into
15 depression 44 produces the opposite result i.e. permitted clockwise pivotal movement (arrow 54) of housing 32 relative to gear 18 resulting in pawl end 36 being cammed into a next gullet 52, with counterclockwise movement of housing 32 producing simultaneous rotation of gear 18 and thus tube 16 to produce outwardly directed movement of shafts 24 and 26.

20 Thus it will be apparent that the pawl positions as between Fig. 3 and Fig. 5 readily produces selected outward or inward movement of shafts 24 and 26, with inward movement providing tightening of the chain.

Reference is now made to Fig. 2 which is a view of the tube 16 including gear 18 with housing 32 and pawl 34 mounted to tube gear 18 and shafts 24, 26
25 threadably engaged with the tube ends. It will be observed that as is differentiated from Fig. 2A, the shafts 24, 26 are shown near full insertion into the tube 16 as when the chain is fully tightened. The tightening function is preferably accomplished by the use of a handle 58 which is pivotally attached to a lug portion

60 fixed to the inboard side of housing 32. In the pivotal position shown in dash lines, an operator can apply a leveraged force to pivot the housing in either of directions 53 or 54 (Figs. 3 and 5). The pivotal connection of the handle 58 allows the handle to be pivoted to a parallel and overlying position with tube 16 as seen in solid lines in Fig. 2. Such overlying position is desirable during non-tightening or loosening operation both as a safety provision when the tool is in use for binding a load and for storage when not being used. To assist in retaining either the extended (dash line) or folded position of the handle 58, a spring biased retention mechanism 59 like that of spring 48, pinion 50 and detents 40, 44 is incorporated into the engaging faces of the lever 58 and lug position 60.

It will be appreciated that the ratchet type action is desirable for applying a strong tightening force for cinching the chain links 10 and 12 together. It is also desirable for initial release of the tightening force as when preparing to unload the load. However, the process of ratchet movement of the tube is in small increments and to move the shafts in and out of the tube requires many back and forward movements of lever 58 (a full revolution of the tube may take 20 pulls of the level 58 and generate an 8th of an inch in movement of the shafts. It is desirable to be able to provide relative movement up to 8 or so inches and such full length movement may require hundreds of pulls on the lever.

The third detent 42 shown most clearly in Fig. 3A provides a response to the tedious working of the lever to extend and contract the shafts out of and into the tube 16 when not under load. The pawl 34 is pivoted to the intermediate position of Fig. 4 where the pinion 50 is seated in depression 42 and retains the pawl out of engagement with the teeth of gear 18. Tube 16 may be provided with a rubber like hand grip on its exterior (Fig. 2) but in any event the tube 16 can then be rapidly turned by hand to produce either inward or outward movement of the shafts 24, 26 (the shafts again being held from common rotation with the tube, e.g., by chain links 10, 12 or other means).

A third beneficial feature of the present embodiment of the invention is the provision of a lock that prevents tampering of the tool when in a load tightened condition. See Figs. 3, 3A, 4 and 5 wherein a through bore 62 is provided in pawl end 38 and a through bore 64 is provided in housing 32. As seen in Fig. 3, with the
5 pawl 34 pivoted to its tightening position, the through bores 62 and 64 are aligned. As seen in Fig. 1, such alignment of the through bores 62, 64 permits the insertion of a lock, illustrated by reference 66. As additional protection against e.g. removal of the device from the load, the loosened lengths of links between links 10 and 12 typically allow for one of these links to be locked to the device as illustrated in
10 Fig. 1.

Those skilled in the art will likely conceive of numerous modifications and variations of the features described herein which are considered to be applicant's preferred embodiment as of the filing of the application. Three somewhat
independent features are believed unique including the provision of a free turning
15 pawl position, a storage or inoperable position for the handle, and a pawl lock for protection against inadvertent or vandalous loosening of the binder. The appended claims are accordingly intended to be given their broad interpretation and meaning to encompass the full scope of the invention.